CLAIMS PTO

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Claim 1 (Withdrawn): A method for aiding product life cycle planning, comprising:

setting product use period and longest part useful life of product;

determining product use period ≤ 0.5 x longest part useful life; and

automatically proposing reuse of parts when product use period ≤ 0.5 x longest part useful life is satisfied.

Claim 2 (Withdrawn): A method for aiding product life cycle planning, comprising:

generating information concerning worth degradability wherein worth detervoration of parts relates to discard of product and cost ratio of parts to a whole product; and

extracting, from the information, parts which is impossible to upgrade and has highest worth degradability as improvement object parts.

Claim 3 (Withdrawn): A method for aiding product life cycle planning, comprising:

generating information concerning use period and useful life of parts; and

extracting, from the information, parts whichis impossible to upgrade and has shortest use period as improvement object parts.

Claim 4 (Withdrawn): A method for aiding product life cycle planning, comprising:

generating information concerning use period and useful life of parts; and

extracting, from the information, parts whose maintenance replacement is impossible and whose useful life is shortest as improvement object parts.

planning, comprising:

generating information concerning use period and useful life of parts; and

extracting, from the information, parts whose maintenance replacement is impossible and whose useful life is shortest as improvement object parts.

5. A method for aiding product life cycle planning, comprising:

generating information concerning cost ratio of parts to a whole product and environment load ratio; and

extracting reuse candidate parts from the information.

6. A method according to claim 5, comprising:

producing a two-dimensional graph wherein the cost ratio and the environment load ratio are indicated by axes, based on the information; and

dividing the graph into a plurality of domains, and

said extracting step including extracting the reuse candidate parts from at least one of the domains in which parts are existed.

7. A method according to claim 5, comprising:

generating information concerning cost ratio of parts to the whole product and environment load ratio;

producing a two-dimensional graph wherein the cost ratio and the environment load ratio are indicated by

axes based on the information;

assigning each part to one of division domain obtained by dividing the graph based on a given threshold; and

extracting a reuse candidate part from a domain in which parts are existed.

Claim 8 (Withdrawn): A method for aiding product life cycle planning comprising:

generating information concerning a use period of reuse source product i, a remaining useful life of parts j to be included in the reuse source product, a use period of reuse destination product i', a production period of reuse source product i and a production period of reuse destination product i'; and determining that parts is possible to reuse only in the case where the remaining useful life of parts j to be included in the reuse source product remains more than the use period of reuse destination product i' even if the use period of reuse source product i is elapsed, and width of parts j continues even if time lag until production of reuse destination product i' is started, the production period of reuse source product i and the use period of reuse destination product i' are considered, and the amount of recovery of reuse source product i is enough within the production period of reuse destination product i' based on the information.

Claim 9 (Withdrawn): An apparatus for aiding product life cycle planning, comprising:

a setting device configured to set product use period and longest part useful life of product;

a determination section configured to determine product use period ≤ 0.5 x longest part useful life, and

a proposing device configured to automatically propose reuse of parts when product use period ≤ 0.5 x longest part useful life is satisfied.

Claim 10 (Withdrawn): An apparatus for aiding product life cycle planning, comprising:

a generator configured to generate information concerning worth degradability wherein worth deterioration of parts relates to discard of product and cost ratio of parts to a whole product, and

an extracting device configured to extract, from the information, parts which is impossible to upgrade and has highest worth degradability as improvement object parts.

Claim 11 (Withdrawn). An apparatus for aiding product life cycle planning, comprising:

a generator configured to generate information concerning use period and useful life of parts; and

an extracting device configured to extract, from the information, parts which is impossible to upgrade and has shortest use period as improvement object parts.

Claim 12 (Withdrawn). An apparatus for aiding product life cycle planning, comprising:

a generator configured to generate information concerning use period and useful life of parts, and

an extracting device configured to extract, from the information, parts whose maintenance replacement is impossible and whose useful life is shortest as improvement object parts.

13. An apparatus for aiding product life cycle planning, comprising:

a generator configured to generate information concerning cost ratio of parts to a whole product and environment load ratio; and

an extraction device configured to extract reuse candidate parts from the information.

14. An apparatus according to claim 13, comprising:

a production device configured to produce a two-dimensional graph wherein the cost ratio and the environment load ratio are indicated by axes, based on the information; and

a dividing device configured to divide the graph into a plurality of domains, and

said extraction device extracting the reuse candidate parts from at least one of the domains in which parts are existed.

15. An apparatus according to claim 13, comprising:

a generating device configured to generating information concerning cost ratio of parts to the whole product and environment load ratio;

a producing device configured to produce a two-dimensional graph wherein the cost ratio and the environment load ratio are indicated by axes based on the information;

an assigning device configured to assign each part to one of division domain obtained by dividing the graph based on a given threshold, and

an extracting device configured to extract a reuse candidate part from a domain in which parts are existed.

a generator configured to generate information concerning a use period of reuse source product i, a remaining useful life of parts j to be included in the reuse source product, a use period of reuse destination product i', a production period of reuse source product i and a production period of reuse destination product i' and

means for determining that parts is possible to reuse only in the case where the remaining useful life of parts j to be included in the reuse source product remains more than the use period of reuse destination product i' even if the use period of reuse source product i is elapsed, and worth of parts j continues even if time lag until production of reuse destination product i' is started, the production period of reuse source product i and the use period of reuse destination product i' are considered, and the amount of recovery of reuse source product i is enough within the, production period of reuse destination product i' based on the information.

Claim 17 (Withdrawn). A program product for aiding product life cycle planning, comprising:

means for instructing a computer to prepare product use period and longest part useful life of product;

means for instructing the computer to determine product use period ≦ 0.5 x longest part useful life, and

means for instructing the computer to propose parts reuse to the new product when product use period ≦ 0.5 x longest part useful life is satisfied.

18. A program product for aiding product life cycle planning comprising:

means for instructing a computer to prepare information concerning cost ratio of parts to a whole product and environment load ratio;

means for instructing the computer to produce

Claim 16 (Withdrawn). An apparatus for aiding product life cycle planning comprising:

Claim 19 (Withdrawn): A program product for aiding product life cycle planning, comprising:

means for instructing a computer to generate information concerning a use period of reuse source product i, a remaining useful life of parts j to be included in the reuse source product, a use period of reuse destination product i', the production period of reuse source product i and a production period of reuse destination product i'; and

means for instructing the computer to determine that parts is possible to reuse only in the case where the remaining useful life of parts j to be included in the reuse source product remains more than the use period of reuse destination product i' even if the use period of reuse source product i is elapsed, and worth of parts j continues even if time lag until production of reuse destination product i' is started, the production period of reuse source product i and the use period of reuse destination product i' are considered, and the amount of recovery of reuse source product i is enough within the production period of reuse destination product i' based on the information.

Claim 20 (Withdrawn): A program product for aiding product life cycle planning according to claim 19, comprising means for instructing to set the product use period such that a remaining useful life of parts j to be included in the reuse source product remains more than the use period of reuse destination product i' even if the use period of reuse source product i is elapsed.

Claim 21 (Withdrawn): A program product for aiding product life cycle planning comprising:

means for instructing a computer to prepare information concerning worth degradability wherein worth deterioration of parts relates to discard of product and cost ratio of parts to a whole product;

means for instructing the computer to extract parts whose cost ratio exceeds threshold and whose worth degradability is highest as improvement object parts; and

means for instructing to propose inexpensive upgrade wherein cost ratio is not more than threshold about the improvement object parts.

Claim 22 (Withdrawn): A program product for aiding product life cycle planning comprising:

means for instructing a computer to prepare information concerning use period of parts and cost ratio of parts to a whole product,

means for instructing the computer to extract parts whose cost ratio exceeds threshold and whose use period is shortest as improvement object parts; and

means for instructing to propose inexpensive upgrade wherein cost ratio is not more than threshold about the improvement object parts.

Claim 23 (Withdrawn): A program product for aiding product life cycle planning comprising:

means for instructing a computer to prepare information concerning useful life of parts;

means for instructing the computer to extract parts whose maintenance replacement is impossible and whose useful life is shortest as improvement object parts; and

means for instructing the computer to propose maintenance about the improvement object parts.

Claim 24 (Withdrawn): A program product for aiding product life cycle planning comprising:

means for instructing a computer to prepare information concerning use period and useful life of parts;

means for instructing the computer to extract parts whose cost ratio exceeds threshold and whose useful life is shortest as improvement object parts; and

means for instructing the computer to propose inexpensive maintenance wherein cost ratio is not more than threshold about the improvement object parts.

Claim 25 (Withdrawn): A program product for aiding product life cycle planning comprising:

means for instructing a computer to prepare information concerning degradation and abrasiveness of parts and cost ratio of parts to the whole product;

means for instructing the computer to extract parts whose cost ratio exceeds threshold and whose degradation and abrasiveness are largest as improvement object parts; and

means for instructing the computer to propose inexpensive maintenance wherein cost ratio is not more than threshold about the improvement object parts.

Claim 26 (Currently Amended): A method for aiding product life cycle planning, comprising:

setting a threshold value concerning reuse of parts with respect to cost and environment;

reading cost of parts and environment load information from a database;

displaying parts on a map displayed on a display device and divided into a plurality of domains based on the threshold;

selecting reuse candidate parts from the displayed parts with reference to the displayed map;

calculating a useful life based condition formula expressed as follows:

$\min\{la^i, lb^{ij}\} \leq la^j - \min\{la^i, lr^j\}$

where la^i is a useful life time of product i, lr^j is a worth life time of product i, lb^{ij} is a useful life time of part j, and lr^j is a worth life time of part j;

determining whether the useful life based condition formula is satisfied;

determining possibility of reuse with respect to the reuse candidate parts when the useful life based condition formula is satisfied;

calculating a worth life time based condition formula expressed as follows:

$tl_i' + tP^i + \min\{la^i, lr^j\} \leq lr^j$

where tl_i' is a time lag of product i, and tP^i is a production period of product i, la^i is a useful life time of product i, lr^j is a worth life time of product i, and lr^j is a worth life time of part j;

determining whether the worth life time based condition formula is satisfied; and

determining possibility of reuse with respect to the reuse candidate parts when the worth life time based condition formula is satisfied;

calculating a recovery quantity based condition formula expressed as follows:

$\min\{la^i, lb^{ij}\} < tl_i' + \omega i^j$

where $0 < \omega < 1$, la^i is a useful life time of product i, lr^j is a worth life time of product i, tl_i' is a time lag of product i, and tP^i is a production period of product i;

determining whether the recovery quantity based condition formula is satisfied;

[[and]]

determining on a computer possibility of reuse with respect to the reuse candidate parts when the recovery quantity based condition formula is satisfied; and

displaying the determination of possibility of reuse with respect to reuse of candidate parts.

Claim 27 (Previously Presented): The method according to claim 26, wherein the map is divided into four domains: a domain where reuse should be actively examined, a domain where reuse should be fairly actively examined, a domain which fails to be suitable for reuse and a domain where reuse is examined.

Claim 28 (Previously Presented) The method according to claim 26, further comprising

calculating a worth life based condition formula for determining that worth of parts j satisfying the useful life based condition formula continues even if time lag until production of reuse destination product i is started, the production period of reuse source product i and the use period of reuse destination product i are considered.

Claim 29 (Previously Presented) The method according to claim 28, wherein the map is divided into four domains: a domain where reuse should be actively examined, a domain where reuse should be fairly actively examined, a domain which fails to be suitable for reuse and a domain where reuse is examined.

Claim 30 (Previously Presented) An apparatus of aiding product life cycle planning, comprising

an input device configured to set a threshold value concerning reuse of parts with respect to cost and environment;

a reading device configured to read cost of parts and environment load information from a database;

a display device configured to display parts on a map divided into a plurality of domains based on the threshold;

a selecting device configured to select reuse candidate parts from the displayed parts with reference to the displayed map;

a computing device configured to calculate a useful life based condition formula expressed as follows:

$$\min\{la^{i}, lr^{j}\} \geq la^{j} - \min\{la^{i}, lr^{i}\}$$

where la^{i} is a useful life time of product i, lr^{i} is a worth life time of product i, la^{j} is a useful life time of part j, and lr^{j} is a worth life time of part j,

a first determining unit configured to determine whether the useful life based condition formula is satisfied;

a second determining unit configured to determine possibility of reuse with respect to the reuse candidate parts when the useful life based condition formula is satisfied,

the computing device calculates a worth life time based condition formula expressed as follows:

$$tl_{i}' = tl^{i} + \min\{la^{i}, lr^{i}\} \leq lr^{j}$$

where tl_{i}' is a time lag of product i, and tl^{i} is a production period of product i, la^{i} is a useful life time of product i, lr^{i} is a worth life time of product i, and lr^{j} is a worth life time of part j,

the first determining unit determines whether the worth life time based condition formula is satisfied, and

the second determining unit determines possibility of reuse with respect to the reuse candidate parts when the worth life time based condition formula is satisfied.

the computing unit calculates a recovery quantity based condition formula expressed as follows

$$\min\{la^i, lr^j\} \geq tL^i + \alpha tP^i$$

where $0 \leq \alpha \leq 1$, la^i is a useful life time of product i, lr^j is a worth life time of product i, tL^i is a time lag of product i, and tP^i is a production period of product i;

the first determining unit determines whether the worth life time based condition formula is satisfied, and

the second determining unit determines possibility of reuse with respect to the reuse candidate parts when the recovery quantity based condition formula is satisfied.

Claim 31 (Previously Presented): The apparatus according to claim 30, wherein the map is divided into four domains: a domain, where reuse should be actively examined, a domain where reuse should be fairly actively examined, a domain which fails to be suitable for reuse and a domain where reuse is examined.

Claim 32 (Previously Presented): The apparatus according to claim 30, further comprising,

a computing device configured to calculate a worth life based condition formula for determining that worth of parts j satisfying the useful life based condition formula continues even if time lag until production of reuse destination product i' is started, the production period of reuse source product i and the use period of reuse destination product i' are considered.

Claim 33 (Previously Presented): The apparatus according to claim 32, wherein the map is divided into four domains: a domain where reuse should be actively examined, a domain where reuse should be fairly actively examined, a domain which fails to be suitable for reuse and a domain where reuse is examined.

Claim 34 (Previously Presented): A computer readable recording medium containing a computer program to aide product life cycle planning, the program comprising instructions to

set a threshold value concerning reuse of parts with respect to cost and environment;

read cost of parts and environment load information from a database;

display parts on a map divided into a plurality of domains based on the threshold;

receive a selection of reuse candidate parts from the displayed parts with reference to the displayed map.

calculate a useful life based condition formula expressed as follows:

$\min\{la^i, lr^j\} \leq la^i - \min\{la^m, lr^n\}$

where la^i is a useful life time of product i', lr^j is a worth life time of product i', la^m is a useful life time of part j, and lr^n is a worth life time of part j,

determine whether the useful life based condition formula is satisfied; and

determine possibility of reuse with respect to the reuse candidate parts when the useful life based condition formula is satisfied;

calculate a worth life time based condition formula expressed as follows:

$tl^i + tp^i + \min\{la^m, lr^n\} \leq lr^j$

where tl^i is a time lag of product i', and tp^i is a production period of product i', la^m is a useful life time of product i', lr^n is a worth life time of product i', and lr^j is a worth life time of part j,

determine whether the useful life based condition formula is satisfied;

determine possibility of reuse with respect to the reuse candidate parts when the useful life based condition formula is satisfied;

calculate a recovery quantity based condition formula expressed as follows:

$\min\{la^m, lr^n\} < tl^i + tp^i$

where $0 \leq \alpha \leq 1$, la^m is a useful life time of product i', lr^n is a worth life time of product i', tl^i is a time lag of product i', and tp^i is a production period of product i';

determine whether the worth life time based condition formula is satisfied; and

determine possibility of reuse with respect to the reuse candidate parts when the recovery quantity based condition formula is satisfied

Claim 35 (Previously Presented): The program according to Claim 34, wherein the map is divided into four domains: a domain where reuse should be actively examined, a domain where reuse should be fairly actively examined, a domain which fails to be suitable for reuse and a domain where reuse is examined.

Claim 36 (Previously Presented): The computer readable recording medium according to claim 34, further comprising instructions to calculate a worth life based condition formula for determining that worth of parts j satisfying the useful life based condition formula continues even if time lag until production of reuse destination product i' is started, the production period of reuse source product i and the use period of reuse destination product i' are considered.

Claim 37 (Previously Presented): The computer readable recording medium according to claim 36, wherein the map is divided into four domains: a domain where reuse should be actively examined, a domain where reuse should be fairly actively examined, a domain which fails to be suitable for reuse and a domain where reuse is examined.